Growth parameter estimates of Listeria monocytogenes in cooked chicken: effect of preparation of inoculum

Birk, Tina; Smith Ottosen, Sussi; Hansen, Tina Beck

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

DTU Food
National Food Institute

Growth parameter estimates of *Listeria monocytogenes* in cooked chicken: effect of preparation of inoculum

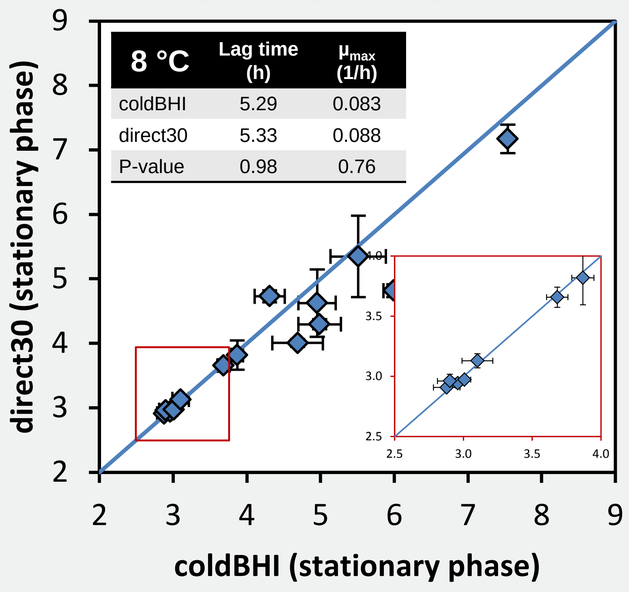
Tina Birk, Sussi Smith Ottosen and Tina Beck Hansen[a]

Objective

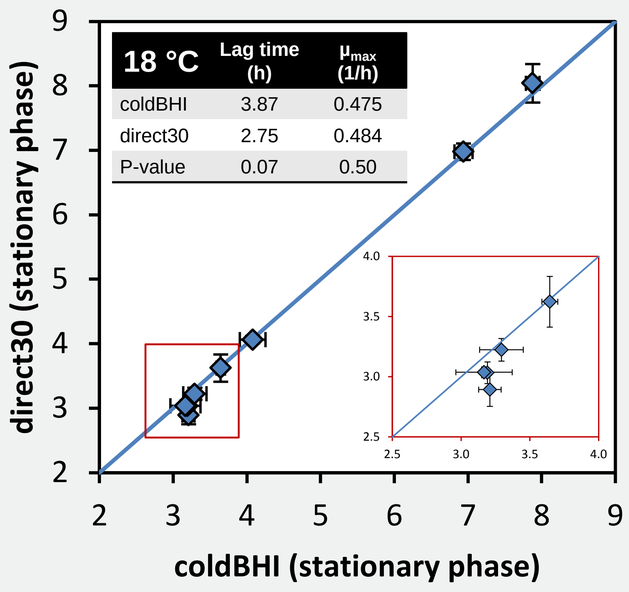
Growth curves, and estimates of lag times and growth rates, for *Listeria monocytogenes* on slices of sous-vide cooked chicken breast were compared for four inoculum preparation procedures; coldBHI (control procedure), direct30 and direct8 (t-test against the control), and coldMRD (graphical comparison of lag times, λ, and growth rates, μ_{max}, with the control). Inoculum volumes of 0.44 ± 0.11 % were used.

Results: direct30

8 °C	Lag time (h)	μ_{max} (1/h)
coldBHI	5.29	0.083
direct30	5.33	0.088
P-value	0.98	0.76



18 °C	Lag time (h)	μ_{max} (1/h)
coldBHI	3.87	0.475
direct30	2.75	0.484
P-value	0.07	0.50



Conclusion

Even with inoculation volumes lower than 1%, fitted growth parameter estimates were affected by the preparation of inoculum.

- **λ was mostly affected by growth phase then temperature shifts and lastly presence of nutrients, such as glucose, in the inoculum**
- **μ_{max} was only affected by presence of nutrients**

Overnight cultures (BHI, 30 °C)

coldBHI
stationary phase, cold inoculation

Kept chilled for 3 d, sub-cultured by dilution in fresh BHI

8, 18 °C

Direct30
stationary phase, warm inoculation

Sub-cultured by dilution in fresh BHI

9, 19 °C

Direct8
exponential phase, cold inoculation

Sub-cultured by dilution in fresh BHI, kept chilled for 3 d

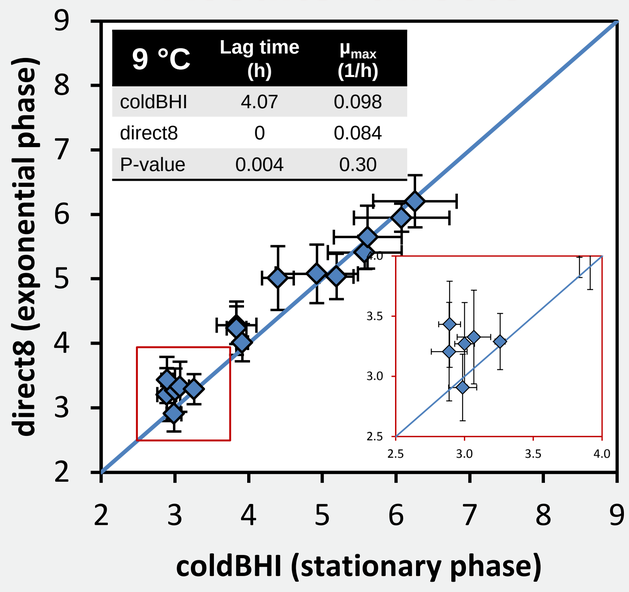
6-24 °C

coldMRD
stationary phase, cold inoculation

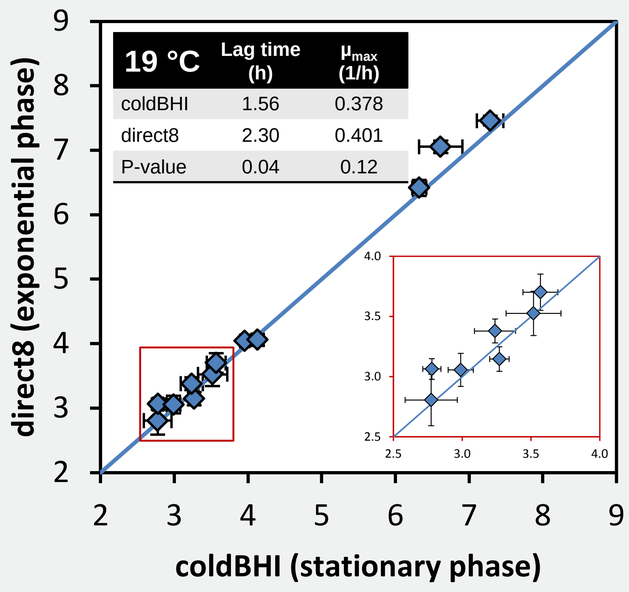
Kept chilled for 3 d, sub-cultured by dilution in MRD

Results: direct8

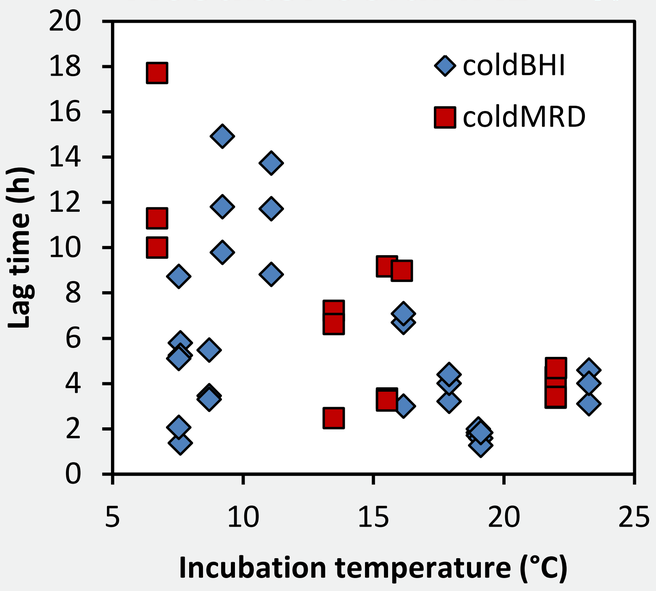
9 °C	Lag time (h)	μ_{max} (1/h)
coldBHI	4.07	0.098
direct8	0	0.084
P-value	0.004	0.30



19 °C	Lag time (h)	μ_{max} (1/h)
coldBHI	1.56	0.378
direct8	2.30	0.401
P-value	0.04	0.12



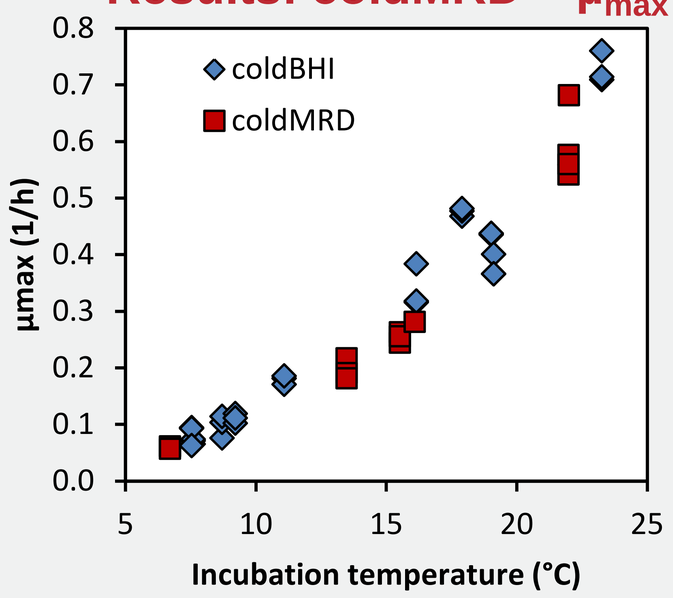
Results: coldMRD – λ



Results: cross-validation

Procedure	μ_{max} model	Bias factor	Accuracy factor
coldBHI	$\sqrt{\mu_{max}} = 0.0350 \cdot (T + 0.37)$	1.12	1.14
coldMRD	$\sqrt{\mu_{max}} = 0.0344 \cdot (T - 0.21)$	0.88	1.17

Results: coldMRD – μ_{max}



a: for further information contact Tina Beck Hansen at tibha@food.dtu.dk, National Food Institute, Technical University of Denmark, Kemitorvet, Building 202, DK-2800 Kgs. Lyngby, Denmark